Description

ARRANGEMENT FOR STATE MONITORING FOR COMPONENTS IN A PACKET SWITCHED COMMUNICATION NETWORK

The invention relates to an arrangement for monitoring components in a communication network.

It is known practice in modern communication networks to observe, by way of example, the network state of other parties in the same communication installation. Hence, busy lamp arrays or PC applications are used at the switchboard positions of the communication installations to indicate whether each party is currently free or busy or is in the call state.

In addition, terminals in communication installations are frequently equipped with direct call keys which can be used to call another party in the same communication installation by pressing a key. These direct call keys usually have an associated LED or other indicator element, with the network state of the associated party being indicated by the LED lighting or flashing, for example.

If a plurality of PC applications are intended to be operated in one communication installation, then the information about the network state of the visually indicated internal parties needs to be buffer-stored on a server and forwarded from there to the PCs to indicate the state. To this end, each monitoring PC application stores on the server the telephone numbers as addresses for the terminals which it is to monitor. The server then uses a data link to prompt the start of a monitoring process in the communication installation. This monitoring instruction is frequently also called "setting a monitoring

point". In the event of a change of state in the monitored component, the communication installation sends a corresponding message to the server, which forwards it to the PC applications. A server may also collect and forward state information about the internal parties in a plurality of communication installations in a communication network in the manner of a network complex, by virtue of a respective data link being set up to each communication installation.

A drawback which has been found with the various arrangements is that the services for monitoring party states in a communication network are respectively limited to the parties in an individual communication installation or to the parties in a few communication installations combined into a network complex. Parties which are not connected to the same communication installation or to the same network complex, and also the service, cannot be monitored. In addition, connecting a plurality of appliances for the purpose of visually indicating party states and for the purpose of monitoring parties in a plurality of communication installations requires a central entity in the communication network, that is to say a server.

It is an object of the invention to allow the states of parties or, generally, of addressable components in a communication network to be monitored independently of their location.

This object is achieved for the apparatus by the features specified in claim 1 and for the method by the features specified in claim 9. The characterizing features of the subclaims provide advantageous further refinements of the apparatus.

In relation to the apparatus, the solution provides for each monitorable and monitoring component to have

communication means for direct data interchange, for the monitoring

component to transmit the monitoring instruction directly to the component which is to be monitored, and for each monitorable component to have storage means for the addresses contained in the monitoring instructions and monitoring means for state monitoring which, at least in the event of a change of state, transfers a state to be monitored directly to the monitoring component using the communication means. The advantage of this solution is that monitoring takes place directly between components without any interposed service and that, in networks made up of subnetworks, a monitoring component arranged in a subnetwork can monitor other components in other subnetworks too, that is to say independently of their location.

Direct connections between components can be set up particularly easily if the communication network is a packed switched network (IP network).

If the number of addresses which can be registered in a storage means are prescribable, then the network loading brought about by the monitoring operations can be aligned.

The data interchange required for transferring changes of state is minimized by virtue of the monitoring instruction comprising information about which changes of state are to be transferred.

If the monitoring component uses the information about states or changes of state for visual indication and/or for storage and/or for forwarding to other components, then the information obtained can be evaluated flexibly.

Data protection requirements can be met by virtue of the monitored component being able to disable

monitoring by individual or all monitoring components.

Unsuccessful call attempts between parties in a communication network can be avoided if, in cases in which a monitoring instruction cannot be transmitted, the monitoring component outputs a corresponding indicator and makes a fresh transmission attempt at stipulated intervals of time.

If the information about the transmitability of the monitoring instruction can be used to determine a network state for the component which is to be monitored, then the network state may also be indicated for those monitored components which do not transfer any information about their state or about their change of state to the monitoring component.

An exemplary embodiment of an arrangement based on the invention for monitoring components in a communication network is described below with reference to the drawing.

In this context, the single figure shows a VoIP (Voice over IP = Voice over Internet Protocol) communication network which comprises a plurality of communication installations and parties respectively connected thereto, which in a general sense are components B1-B6, C1-C6, D1-D6 in the communication network.

All of the components B1-B6, C1-C6, D1-D6 in the communication network are connected to one another by means of a packet switched network (IP network). In this case, the network is a hybrid form comprising ring-shaped and star-shaped intermeshing. In principle, it is also possible to use any other type of networking, provided that the components B1-B6, C1-C6, D1-D6 are certain to be able to interchange data with one another either directly or indirectly, that is to say with the interposition of other components. In the figure, the lines between the components B1-B6, C1-C6,

D1-D6 represent data links. The components B1-B6 in the form of servers provide

a switching function in the communication network. This is also called a gatekeeper function. In a gatekeeper, the direct dial telephone numbers, which are also known from circuit switched telephony, are associated with the network addresses (IP addresses). The gatekeeper, e.g. component B1, is thus used to set up a communication link between two components C6, D1. During a call between the components C6, D1, the data packets containing the voice data are transferred directly between the components C6, D1, however, without - in contrast to circuit switched telephony - the interposition of a switching node. Only when a connection between the components C6, D1 is cleared down is information transmitted to the gatekeeper A again, namely information relating to connection cleardown.

Each component B1-B6, C1-C6, D1-D6 in the communication network can be monitored by one of the other components B1-B6, C1-C6, D1-D6, that is to say the component B1 the can be monitored by the components B2-B6, C1-C6, D1-D6, the component B2 can be monitored by the components B1, B3-B6, C1-C6, D1-D6 and so on, and each component B1-B6, C1-C6, D1-D6 can monitor any other component B1-B6, C1-C6, D1-D6, that is to say again the component B1 can monitor the components B2-B6, C1-C6, D1-D6, the component B2 can monitor the component B1, B3-B6, C1-C6, D1-D6 and so on. In this case, the components B1-B6, C1-C6, D1-D6 may be both terminals (that is to say telephones, telephony clients installed on PCs, video terminals or the like) and network components (that is to say communication servers, gateways, gatekeepers or the like).

All of the components B1-B6, C1-C6, D1-D6 are equipped for monitoring with a communication module as communication means (communication unit), which permits direct communication with the respective other

components B1-B6, C1-C6, D1-D6, that is to say without interposition of a further entity. (In a communication network based on the

Internet Protocol (IP network), fundamentally all of the components B1-B6, C1-C6, D1-D6 are equipped with such a communication module).

In addition, all of the components B1-B6, C1-C6, D1-D6 can be monitored and are therefore equipped with a storage unit as storage means (memory) storing the addresses of those components B1-B6, C1-C6, D1-D6 which need to be provided with state information about the network state.

Also, all of the components B1-B6, C1-C6, D1-D6 comprise a processing unit which is able to observe its own network state and to send changes, of state, via the communication module, to the addresses stored in a storage unit. For the purpose of monitoring, the processing unit in the monitoring component uses the communication module to set up a respective connection to the component B1-B6, C1-C6, D1-D6 which is to be monitored and stores it own address in the storage unit there.

It goes without saying that the processing unit in the component B1-B6, C1-C6, D1-D6 to be monitored and in the monitored component B1-B6, C1-C6, D1-D6 may respectively be various processing units or else various types of processing units, particularly if some of the components are monitorable only and some are monitoring only.

The text below describes by way of example the flow of a monitoring operation between the components D1 and C6, where the network state ("free", "busy" or "in call state") of a monitored component D1 is intended to be indicated on a monitoring component C6.

In this case, a user first activates, on an IP telephone as the monitoring component C6, a function for permanently indicating the call state of the component D1, which is likewise an IP telephone. To this end, the user inputs the appropriate command and the telephone number of the component D1 on the component C6. The component C6 first converts the direct dial number of the component D1 into the network address, that is to say the IP address, of the component D1 internally in the appliance. In cases in which this association cannot be made using a table which already exists in the component C6, the network address of the component to be monitored is assessed by checking with the gatekeeper A. The component C6 now uses the network to send a monitoring instruction directly to the component D1, said instruction firstly containing details about what states and changes of state are to be monitored and secondly containing the network address of the component C6 to which the states or change of state are to be transmitted. In this case, it is necessary to monitor the call state of the component D1, that is to say the states "free", "busy" and "involved in a call" ("telephone ringing"). The component D1 receives this monitoring instruction and stores the address of the component C6 together with the information about what states are to be monitored in a memory area provided for the purpose, provided that the number of addresses already stored therein has not already reached a previously stipulated maximum value. The address to be stored must also not have been entered in a "prohibited list" or satisfy a "prohibited condition", and a decision may also be made on the basis of "authority lists" or "authority conditions". Following storage, monitoring means (provided) which, by way of example, may be arranged in the processing unit in the component D1 are used to start a monitoring process which continually monitors the call state of their own component D1. The component D1 then uses the

communication means (communication unit) to transmit to the component C6 an acknowledgement message confirming the start

of monitoring. This acknowledgement message already contains the information about the current call state, and this information is stored in the component C6 as starting value. On the display of the component C6, an indicator field for the component D1 is then set up, said indicator field having or being able to show various symbols for the three call states and showing the current call state as start value.

If the acknowledgement message does not appear within a prescribed period or if the acknowledgement message is negative, then an "unobtainable" or "unmonitorable" state is shown. If the acknowledgement message does not appear, a fresh monitoring instruction can be sent at intervals of time so that monitoring starts as soon as the component D1 is available again. The availability of a component D1 which is to be monitored can also be determined using the PING method known from IP networks, which involves a specific data packet being transferred via the network as a test message.

As soon as the call state of the component D1 changes, for example whenever the user of the component D1 starts a call, this is recorded by the monitoring process in the component D1 and a corresponding message is sent to all those addresses in the previously described memory area with which the monitoring of the call state is associated. Thus, in this case, the ongoing call means that a message comprising the "busy" call state is transmitted from the component D1 to the component C6. On the display of the component C6, the component D1 is now assigned a symbol which visually indicates the new "busy" call state.

The component C6 also uses this information for the purpose of only ever providing the user operating on it with the communication channels which are currently possible. If the user of the

component C6 starts a call to the component D1, then corresponding advice of the "busy" call state may immediately be given and, as an alternative communication channel, an input field for inputting a text-based short message (SMS), in which the direct dial number for the component D1 has been preassigned in the address field, may automatically be activated.

Patent claims

1. An arrangement having components (B1-B6, C1-C6, D1-D6) which can be addressed in a communication network,
where a respective component (B1-B6, C1-C6, D1-D6) can be monitored by at least one other component (B1-B6, C1-C6, D1-D6),
where a respective monitoring instruction is given by a monitoring component (C6), said instruction comprising the address of this component (C6),
characterized
in that each monitorable and monitoring component (D1, C6) has communication means for direct data interchange,
in that the monitoring component (C6) transmits the monitoring instruction directly to the component (D1) which is to be monitored, and
in that each monitorable component (D1) has storage means for the addresses contained in the monitoring instructions and monitoring means for state monitoring which, at least in the event of a change of state, transfers a state to be monitored directly to the monitoring component (C6) using the communication means.

2. The arrangement as claimed in claim 1,
characterized
in that the communication network is a packet switched network (IP network).

3. The arrangement as claimed in one of the preceding claims,
characterized
in that the number of addresses which can be registered in a storage means are prescribable.

4. The arrangement as claimed in one of the preceding

claims,

characterized

in that the monitoring instruction comprises information about which changes of state are to be transferred.

5. The arrangement as claimed in one of the preceding claims,
characterized
in that the monitoring component (C6) uses the information about states or changes of state for visual indication and/or for storage and/or for forwarding to other components (B1-B6, C1-C5, D1-D6).

6. The arrangement as claimed in one of the preceding claims,
characterized
in that the monitored component (D1) can disable monitoring by individual or all monitoring components (B1-B6, C1-C6, D2-D6).

7. The arrangement as claimed in one of the preceding claims,
characterized
in that, in cases in which a monitoring instruction cannot be transmitted, the monitoring component (C6) outputs a corresponding indicator and makes a fresh transmission attempt at stipulated intervals of time.

8. The arrangement as claimed in claim 7,
characterized
in that the information about the transmitability of the monitoring instruction can be used to determine a corresponding state for the component (D1) which is to be monitored.

9. A method for obtaining information about a state or a change of state in a component (B1-B6, C1-C6, D1-D6) which is to be monitored and which is part of an arrangement having addressable components (B1-B6, C1-C6, D1-D6) which are connected in the communication network,
in which a respective component (D1) can be monitored by at least one other component (C6),

where a respective monitoring instruction is given by a monitoring component (C6), said instruction comprising the address of this component (C6),
characterized

in that the monitored and monitoring components (D1, C6) interchange data directly,

in that the monitoring component (C6) transmits the monitoring instruction directly to the component (D1) which is to be monitored,

in that each monitored component (D1) stores the address of each monitoring component (C6), monitors its own state itself and transfers it to the monitoring component (C6) at least in the event of a change of state.